

Claims

1. Integrated speaker carrier and antenna element for a communication terminal, comprising a sheet of a flexible film having a conductive first portion (31) forming
5 a first antenna element, **characterised by** an elongated second portion (33) carrying a conductive lead (34) extending from adjacent (36) to said first portion to a speaker (41) connected to an outer end (40) of said elongated second portion, wherein said elongated second portion is bendable such that said speaker is positioned at an aperture (32) in said first portion.
- 10 2. The integrated speaker carrier and antenna element as recited in claim 1, **characterised in** that said second portion carries a pair of conductive leads (34,35) from adjacent said first portion to respective speaker connection pads (38,39) at said outer end (40).
- 15 3. The integrated speaker carrier and antenna element as recited in claim 1, **characterised in** that said second portion carries at least one conductive lead which is electrically insulated from said first portion.
- 20 4. The integrated speaker carrier and antenna element as recited in claim 1, **characterised in** that said flexible film is made from an insulating material, wherein said first conductive portion and said lead form parts of a layer of a conductive material coated on said flexible film.
- 25 5. The integrated speaker carrier and antenna element as recited in claim 1, **characterised in** that said conductive lead extends from a connection pad (36,37) arranged adjacent to said first portion at a straight edge of said flexible film.
- 30 6. The integrated speaker carrier and antenna element as recited in claim 1, **characterised in** that said conductive first portion is a ground plane of an antenna for a radio communication terminal.

7. The integrated speaker carrier and antenna element as recited in claim 1,
characterised in that said conductive first portion is a an antenna element of an
antenna for a radio communication terminal, and has a pattern adapted to provide
5 resonance at predetermined radio frequencies.

8. The integrated speaker carrier and antenna element as recited in claim 6,
characterised by a support structure (100) carrying a second antenna element
(101), arranged at a predetermined distance from said first antenna element.

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9. The integrated speaker carrier and antenna element as recited in claim 8,
characterised in that said flexible film is attached to said support structure such
that said conductive first portion is electrically connected (81,103) to a ground plane
of said support structure.

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10. The integrated speaker carrier and antenna element as recited in claim 8,
characterised in that said flexible film is attached at a side edge (81) thereof, to
said support structure, at which second side edge a connector pad (126,127) to said
conductive lead is arranged.

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11. The integrated speaker carrier and antenna element as recited in claim 10,
characterised in that said connector pad is connected, at said side edge, to speaker
control circuitry (120) arranged on said support structure.

25 12. The integrated speaker carrier and antenna element as recited in claim 8,
characterised in that said flexible film is bar soldered at a straight edge (81) to said
support structure, at which straight edge said conductive first portion is electrically
connected (103) to a ground plane of said support structure, and a connector pad
(104) to said conductive lead is connected to speaker control circuitry (120)
30 arranged on said support structure.

13. The integrated speaker carrier and antenna element as recited in claim 8, **characterised in** that an insulating spacer (61) is arranged intermediate said support structure and said flexible film, defining said predetermined distance between said first and second antenna elements.

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14. The integrated speaker carrier and antenna element as recited in claim 13, **characterised in** that said spacer comprises speaker attachment means (63), devised to secure said speaker adjacent to said aperture.

10 15. The integrated speaker carrier and antenna element as recited in claim 13, **characterised in** that said flexible film is attached to said spacer with an adhesive.

16. The integrated speaker carrier and antenna element as recited in claim 13, **characterised in** that said spacer is attached to said support structure by
15 cooperating engagement members (66,102).

17. The integrated speaker carrier and antenna element as recited in claim 13, **characterised in** that said spacer has a protruding member (66) engaging with a recess (102) in said support structure.

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18. The integrated speaker carrier and antenna element as recited in claim 8, **characterised in** that said support structure is a printed circuit board of a radio communication terminal.

25 19. Radio communication terminal, comprising an integrated speaker carrier and antenna element as recited in any of the previous claims.

20. Method for producing an integrated speaker carrier and antenna element for a communication terminal, **characterised by** the steps of:

30 - providing a flexible film of an insulating material, having a first conductive surface portion, and an elongated second portion carrying a lead insulated from said

first portion and extending away from adjacent to said first portion;

- attaching a speaker an outer end of the elongated second portion, connected to said lead;

- forming an aperture in said first portion, and

5 - bending the elongated second portion such that said speaker is positioned at the aperture.

21. The method as recited in claim 20, wherein the step of providing a flexible film comprises the steps of:

10 - coating said insulating film with a conductive material;

- removing selected portions of the conductive material from the film, to define the first conductive surface portion and the lead; and

- cutting the film such that the elongated second portion thereof, carrying said lead, is shaped;

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22. The method as recited in claim 21, **characterised by** said removing of selected portions of the conductive material including the step of etching.

23. The method as recited in claim 21, **characterised by** defining, in said step of

20 removing of selected portions of the conductive material, a pair of separate leads, insulated from said first portion and extending away from adjacent to said first portion.